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Arithmetical RECREATIONS: OR, ENCHIRIDION OF Arithmetical Questions:

Q 13 a 46

Both Delightful and Profitable.

Whereunto are added

Diverſe Compendious Rules in Arithmetick, by which ſome ſeeming difficulties are removed, and the performance of them rendred familiar and eaſie to ſuch as deſire to be Proficients in the Science of

NUMBERS.

All performed without *ALGEBRA.*

By *Will. Leybourn.*

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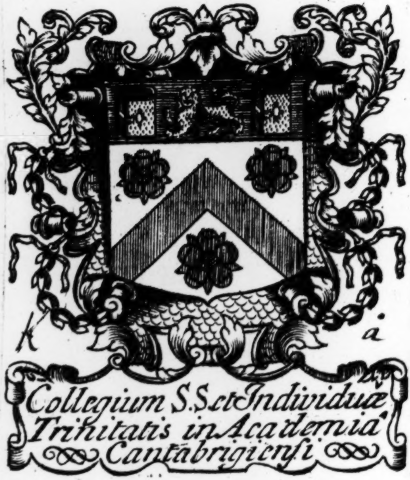

K
a
Collegium S.S. et Individuæ
Trinitatis in Academia
Cantabrigiensi

To the ingenious Student in the Science of Numbers.

IN *the perusal of several* Books, *some of* Vulgar, *some of* Decimal, *and some of* Algebraical Arithmetick: *as also of* Geometry, *and other of the Sciences* Mathematical; *in the viewing and reading whereof, when I met with any de-*

lightful Arithmetical Question, *which to resolve, required more then the common* Rules *of* Vulgar Arithmetick *do afford; I noted them down, which (together with diverse other, which at several times came into my thoughts) I have here heaped together, and bound them up in this small* Enchiridion, *or* handful *of* Numerical Recreations, *for the delight and exercise of such Youths and others, as are studious of, and desire to be Proficients in the* Science *of* Numbers; *Knowing, that by the practice and understanding the reason of these, and such like Questions (which will*

not

*not onely increaſe their knowledge in this Science, but recreate their ſpirits alſo) they ſhall with delight attain to a greater, and more then ordinary degree of knowledge in a ſhort time, then by learning of A-*rithmetick, *as (for the moſt part) it is now taught in Schools, in many Weeks. For, by the practiſing and right underſtanding of the reaſon of the reſolving any few of theſe Queſtions, he ſhall accumulate to himſelf more profit in this Science, then by ſitting at School two or three days; nay, (it may be) ſome weeks, Multiplying and dividing a great*

number of Figures, which when he hath done (to his great loss of time) he knows not what he hath done: nor, sometimes, he which putteth a Youth upon such harsh labour.

But I speak not this; neither publish I this Manual, *to the end it should be the onely Study and Practice of Youth; or to deter their Parents from putting them to School to learn Arithmetick, which is a Jewel fit to adorn all sorts and degrees of Men, from the highest to the lowest: but as useful Recreation, at spare hours, for Boys at School, to appose one another*

nother in; and at vacant times between their School-hours, to busie and delight themselves in. For what is more pleasing to Youth then Recreation? And what Recreation can he better make choice of, then that which will increase his knowledge?

We see by experience, that Man after Toyl and Labour desireth Rest, and after that returns again to his wonted employment, with the greater vigour and alacrity. And this is not experimentally true in Man only, but in other Creatures also, as may appear by that of the Poet.

A *Field* left fallow some
few years, will yeild
The richer Crops, when it a-
gain is till'd :
A *River* stopped by a Sluce a
space,
Runs after rougher , and a
swifter pace :
A *Bow* a while unbent, will
after cast
Its Shafts the farther, and
them fix more fast :
A *Souldier* that a Season
still hath lain,
Comes with more fury to
the Field again.
Even so our *Body*, while
to gather breath,
From *Rest* to *Pain* again
it sojourneth ;

It recollects its Powers,
and with cheer
Falls fresh again into its
first career.

For this, and the forementioned ends and purposes, I have collected these following Numerical Recreations; *in which, if thou takest as much delight in the practice of them, as I have done in the composure, thou shalt in the end finde thy labour not lost, or (when thou comest to years of discretion) think thy time ill spent.*

The Questions are in number 40, intermixed one with another, having no depen-

dance or coherence, every one proving it ſelf without reference to any Rule, but what is to the Eye viſible.

I could have made the number greater, but it would have been to no effect; for he that can work, and underſtand the reaſon of working theſe, may vary and make theſe 40 *amount unto* 400.

After the Queſtions, I have added diverſe compendious Rules in Arithmetick, which will be of good uſe to ſuch that have occaſion to deal in the Multiplying and dividing of great Numbers, and for other purpoſes

poses also. I might have added more, but these were such that at the present came into my minde, and, I think, they are such as are as necessary as any other I could have thought upon; I am sure they are as usefull, and especially to those whose memories are not so quick and ready to Multiply and divide as some others are.

As I finde these accepted, I shall be the more animated to enlarge them, as occasion shall offer it self; in the mean time take this Treatise as it is, peruse it, and practice it, and if thou finde any

thing to thy advantage, make of it, and thank the Editor.

Vale.

Fare ever well, ſo ever
wiſhes he
Who is more thine, than he
can ſeem to be.

Arith-

Arithmetical RECREATIONS: OR, *Enchiridion*, &c.

QUEST. 1.

How to find the Number which any person shall think upon, be it never so great.

Bid the party which thinketh double his thought, and multiply that double by 5, and give you the sum or product of that Multiplication; from which sum or product, if you omit the last

laſt Figure thereof which ſtandeth towards your right-hand, (which will always be a Cypher) the remaining Figure or Figures ſhall be the number which the party thought upon.

Example :

Suppoſe the party ſhould think upon 93, that doubled makes 186, which being multiplyed by 5, the product will be 930; from which ſum, if you omit the laſt Figure towards the Right-hand, (which is here a Cypher) the reſt will be 93, the number which the party thought upon.

But becauſe the laſt place being always a Cypher, may cauſe the other party which thinketh to conceive it eaſily, they being the very Figures which be thought remaining; it will be neceſſary (the more to obſcure the

the businefs) to bid him adde to the laſt product ſome other number, what you pleaſe, and then let him give you the ſum of all; from which, firſt ſubſtracting the number you bid him adde, and then omiting the laſt Figure or Cypher, the remainer then ſhall alſo be the number which the party thought at firſt.

Example:

Suppoſe a party ſhould think upon 297, this doubled will be 594, which being multiplyed by 5, produceth 2970; to which (the more to evade the buſineſs) bid him adde 131, or any other number, and then give you the ſum, which will then be 3101: from which number, if you privately ſubſtract the 131, which you bid him adde, there will remain 2970, from which take the Cypher,

Cypher, and there will remain 297, the number which the party first thought upon.

QUEST. 2.

If two, three, four, or five persons should each of them think upon a several number, to tell what number each person thought upon, provided that none of the persons think above 9.

LEt the first party double the number he thought, and to that adde 5, and that sum multiply by 5, and to it add 10: If from this number you privately substract 35, the first Figure of the remainder towards the left hand

hand ſhall be the number that the firſt party thought upon.

Example.

If the party think —————— 7
That doubled makes —————— 14
To which add 5, makes —————— 19
This 19 multiplyed by 5, makes —————— 95
To which add 10, it is —————— 105

From this 105 take 35, there will remain 70, the firſt Figure whereof is 7, the number thought.

This you may do if one perſon onely think: but if two, three, four or five perſons think, it will ſtill be the ſame.

Example:

Let three perſons, *William*, *James* and *Thomas* think theſe three Numbers, 4, 9 and 6.

William

Williams number is————4
Which bid him double, it makes
————————————8
To which let him add 5, it makes
————————————13
Which let him multiply by 5, it
producech————————65
To this let him add 10, it
makes——————————75

To this product let *James* privately add his number———9
It makes——————————84
Which let him multiply by 10,
it makes————————840

To this product let *Thomas* privately add his number——6
It makes————————846
Which let him multiply by 10,
it makes————————8460
This done, bid them give you this last product, which is 8460: from this product 8460, do you substract 3500, and there will remain

main 4960; the Cypher being omitted, there will be left 4 9 6, which were the three numbers that the three parties thought.

Note, that if one party think, then you must take onely 35 *from the last product: if two parties think, take* 350; *if three parties, take* 3500; *and if four parties,* 35000, &c.

QUEST. 3.

A more artificial way to find the number that any person thinketh upon, without asking him any Questions.

LEt the party that thinketh multiply the number which he thought upon, by what number

ber he pleaſeth; then bid him divide the product of that multiplication, by what other number he pleaſeth. Again, let him multiply this Quotient by what number he pleaſeth, and divide that Quotient again, by what other number he thinketh fit; and let him thus continue multiplying and dividing as many or as few times as he pleaſeth, either 2, 3, 4 or 5 times, or more or leſs at pleaſure [*Onely ſo often as he multiplies and divides, let him tell you by what numbers he multiplies and divides.*] And when he hath multiplyed and divided as often as he liſteth, bid him divide his laſt number by the number he thought upon, and keep the Quotient to himſelf.

In like manner do you take any number at adventure, and privately multiply and divide it as often as he doth, and by the ſame

ſame number as he doth ; and when you have done it as often as he hath done, and divided your laſt number by the number that you ſuppoſed, you ſhall finde your laſt Quotient will be the ſame with his.

Then to know his number which he thought upon at firſt, bid him adde his laſt Quotient to the number which he thought upon, and give you the ſum, from which ſum ſubſtract your laſt Quotient, and the number which he though upon will remain.

Example:

Suppoſe a party ſhould think upon ———————— 50
And multiply it by 4, it makes ———————— 200
And divide that product by 2, it makes ———————— 100
And multiply that Quotient again

gain by 6, it makes——————600
And divide that again by 4, it makes——————150

And thus he may multiply and divide, again and again, if he pleaseth.

In the mean time, suppose you should privately think upon--40
That multiplyed by 4, maketh ——————160
And divided by 2, produceth--80
Which multiplyed again by 6, giveth——————480
And divided by 4, produceth ——————120

Here you see that his last Quotient is 150, which if he divide by 50, the number which he thought, the Quotient will be 3.

In like manner your last Quotient is 120, which if you divide by 40, (the number which you supposed) your Quotient will be also 3, equal to his. Now

Now bid him add his laſt Quotient to his number thought, and give you the ſum, which is 53; from which if you ſubſtract your laſt Quotient 3, there will remain 50, the number which he firſt thought upon.

Again, this being a very delightful and pleaſant Queſtion, wherein there is couched much of the ſubtilty of numbers, I will not let it paſs with one Example, but give you another.

Let the party think————25
And multiply it by 8, makes--200
Divide that by 4, gives————50
That he multiplyes by 3, gives
————————————150
And divides it by 5, gives——30

This 30 being divided by 25, his number thought, giveth in the Quotient $1\frac{5}{25}$ or $1\frac{1}{5}$.

Now

Now ſuppoſe you imagine——30
And multiply that by 8, it makes
————————————240
And divide it by 4, it produceth
————————————60
Which multiplyed by 3, giveth
————————————180
This divided by 5, gives——36

This 36 being divided by 30, your number ſuppoſed, giveth in the Quotient $1\frac{6}{30}$ or $1\frac{1}{5}$ equal to his laſt Quotient.

Now if he add 25 his number thought, to $1\frac{1}{5}$ his laſt number, the ſum will be $26\frac{1}{5}$; from which if you take $1\frac{1}{5}$ your Quotient, there will remain 25, the number which he thought.

QUEST.

QUEST. 4.

If a Pile of Counters, or other pieces of money, or other things, lye on a heap together; and three parties take out from them a certain number unknown to you: by knowing the sum of them all, to finde how many each party took.

BId one of the parties take from the heap either 4, 8, 12, 32, 64, or any other number which may be divided by 4, and keep them to himſelf. Then ſay to the ſecond party, For every four pieces that he hath, do you take ſeven pieces: And let the third party for every four pieces

that the first had, take 13 pieces; which when they have done, bid them put them all together, and give you the sum; which do you divide privately by 3, the Quotient shall be double to the number which the first party took.

Example: Suppose the first party took 12, that is three times 4; then the second person for every four must take 7, that is three times 7, or 21. Lastly, the third person must take three times 13, that is 39: These three parcels being put together, make 72, which if you divide by 3, the Quotient will be 24, the half whereof is 12, the number of pieces that the first party took.

QUEST.

QUEST. 5.

Any number of Counters, Stones, Eggs, or other things being laid in a row, to tell what number any perſon, ſitting by, thinketh upon, provided the party think not a number greater then the number of Counters, Stones, Eggs, &c. which lie before him.

LEt the nine ● following repreſent nine Counters, or the like.

● ● ● ● ● ● ● ● ●

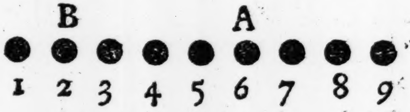
Do you (privately to your ſelf) call that which lyeth next

your left hand One, the next Two, the third Three, &c. that then towards your right hand will be 9. Then bid any person think any number under 9, and pitch his finger upon which of the Counters he pleaseth: then (you knowing privately which Counter it is, whether the first, second, third, or any other) add 9 privately to that number; as if the party should lay his finger upon the sixth Counter, add 9 privately thereto, and it makes 15; therefore bid the party count to himself from that number which he thought, till he make it 15, and that Counter upon which the number 15 falleth, is the number which the party thought upon.

Example:

Example:

Let the nine Counters lye as here you ſee.



Then ſuppoſe a party ſhould think upon 2, and that he ſhould pitch his finger upon the Counter noted with A, (which is the ſixth Counter.) Now (becauſe he pitched upon the ſixth Counter) add privately 9 to 6, and it will make 15: Wherefore, bid him count from the number which he thought upon (beginning at A backwards, till he come to 15; and his number will end at the Counter B, which is the ſecond Counter, denoting that he thought upon 2. For (being he

thought upon 2) if he call the Counter A 2, the next Counter towards the left hand must be 3, the next 4, the next 5 ; and so the first Counter will be 7, then the last Counter will be 8, and the next to it 9 ; and so 15 will end at the Counter B, which is the second Counter, and denotes his number thought upon to be 2. And here note, that whereas here are onely 9 Counters placed, there might as well have been any other number, as 10, 12, 16, 20, 24, or any other number only remember this, that whereas here you added 9 to the number of the Counters that the party pitched his finger upon, you then add that number which is equal to the number of Counters lying before you ; as if 10, then add 10 ; if 12, add 12 ; if 20, add 20, *&c.*

This is the way by which some wil

will diſpoſe the ſeveral ſpots of the Cards, and lay them with the face downwards in order of a Dyal, counting the Ace 1, the Duce 2, the Tray 3, &c. the Queen 11, and the King 12: by which they will undertake to tell what hour you think upon; which is very pleaſant to practiſe, and ſeeming ſtrange to thoſe who know not the reaſon of it.

QUEST. 6.

One person having two Bottles of Wine, in each hand one, the one being Sack, and the other Claret, (or any other two things, as two pieces of Money, &c. provided the one be even and the other odd) to finde in which hand the Bottle of Sack is, and in which the Claret; or in which hand the odd, and in which the even piece of money is.

LEt any person have in his hands two Bottles, one full of Sack, the other full of Claret; how

how to know in which hand he hath the Sack, and in which the Claret; to effect it, do thus:

Bid the partie that hath the Bottles in his hands to double the price of the Wine which he hath in his left hand, and treble the price of that Wine which he hath in his right-hand; then bid him add both numbers together, and ask him whether it be even or odd: if it be even, the Sack (or even piece of money) is in the right hand; but if it be odd, the Claret (or odd piece of money) is in the right-hand.

Example:

Let one have a Bottle of Sack (or 12 *d.*) in his left hand, and a Bottle of Claret (or 5 *d.*) in his right-hand; he having thus disposed them unknown to you, bid him double the money in his

right-hand, it is 24; then bid him treble the piece which is in his left-hand, and it is 15; then bid him add them both together, and they make 39: for 24 and 15 is 39. This done, ask him whether the number be even or odd. He will ſay, Odd. Then tell him he hath the Sack or 12 *d.* in his left hand, and the Claret or 5 *d.* in his right.

Or if he had had the Sack in his left-hand, and the Claret in his right, and you had ſaid, Double that in your right-hand, it makes 10, and treble that in your left, it makes 36; add them together, they make 46; it being even, denotes the Claret or odd number to be in the right-hand. Wherefore obſerve this always:

If you double the right-hand, and the number be even, the odd

odd number is in the right. If you double the right-hand, and the number be odd, the even number is in the right. If you treble the right-hand, and the number be even, the even number is in the right. If you treble the right-hand, and the number be odd, the odd number is in the right.

This may be done by two parties, interchanging two pieces of mony, or by giving two perſons two Cards, one odd, the other even; and placing them before you, that you ſuppoſe one to be the right-hand, and the other the left.

QUEST.

QUEST. 7.

A man being 100 *years of age, upon his birth-day had his three ſons with him at dinner, namely,* William, James *and* Thomas: *the Father ſaying to them, Well ſons, I am this day juſt* 100 *years old; The youngeſt ſon,* William, *ſaid, Father, my brother* Thomas *is four times as old as I am, and my brother* James *is three times as old as I am, and all our ages together are juſt* 100 *years. How old was each of the three ſons?*

TO reſolve this, ſay, *William* was one year old; then *James* muſt

must be three times his age, that is three years old; and *Thomas* must be four times his age, that is four years old: now all these added together make but eight years, whereas they should be 100 years: Wherefore, divide 100 by 8, and the Quotient will be $12\frac{4}{8}$, that is 12 years and an half for the age of *William*. Then,

	Years.	Months.	
William being	12	6	
James must be	37	6	Three times as much, and
Thomas must be	50	0	Four times as much:
In all	100	0	Equal to the Fathers age.

QUEST.

QUEST. 8.

A man dies, and leaves a Legacie of 900 l. *to be disposed of among four of his relations, viz.* A, B, C, *and* D; *which Legacie is to be disposed of in this order;* B *is to have twice as much as* A, *and* C *thrice as much as* B, *and* D *is to have as much and half as much as* C: *what must each person have?*

TO effect this, or the like, suppose that A were to have 1 *l.* then B must have 2 *l.* which is twice as much; and C must have 6 *l.* which is three times as much

much as B; and D muſt have 9 *l.* which is as much and half as much as C.

Theſe numbers added together make 18: divide 900, the whole Legacie, by 18, the Quotient will be 50 *l.* for A, then B muſt have 100 *l.* and C 300 *l.* and D 450 *l.* which all being added together, make 900 *l.* equal to the whole Legacie, and ſo diſpoſed according to the donors will, as by the work following may appear.

					l.
A	1	4	*l.*	A	50
B	2	900	(50	B	100
C	6	188		C	300
D	9	1		D	450
	18				900

QUEST.

QUEST. 9.

A man dies and leaves 3000 l. *to be distributed to his Wife, his Son, and his two Daughters in this wise; That the sons Portion should be double to that of the Mother, and the Mothers Portion double to each of the Daughters. How much must each of their Portions be?*

SUppose the Portion of one of the Daughters to be 1 *l.* then the Mothers Portion must be double to one of the Daughters, (or equal to them both) namely 2 *l.* and the Sons Portion must be double to the Mothers,

thers, namely 4 *l.* Theſe four Portions added together, make 8 *l.* (as in the Example is expreſt) but they ſhould be equal to 3000 *l.* Wherefore divide 3000 by 8, and the Quotient will be 375 *l.* for one of the Daughters Portions: Then the Mothers is twice as much, namely 750 *l.* and the Sons double to that, namely 1500 *l.* All which is viſible by the following Work.

	l.		
One Daughter	1		
The other Daughter	1	~~84~~	*l.*
The Mother	2	~~3000~~	(375
The Son	4	~~888~~	
The ſum	8		

One Daughter	375
The other Daughter	375
The Mother	750
The Son	1500
The ſum	3000

QUEST.

QUEST. 10.

There were in company together four persons, Adam, Edward, Charles, *and* William.--Adam *told* Edward *that he was older then him by two years:* Charles *told them that he was as old as both of them together, and four years over.--* William *hearing them say so, said to them, I am just 96 years old, and that is equal to all your ages. Now how old was* Adam, Edward, *and* Charles *severally?*

SUppose *Edward* were 1 year old, then *Adam* for *Edwards*

wards age put (1), then *Adams* age muſt be (1 more by 2); and *Charles* his age muſt be (2 more by 6): Theſe three ages added together in this manner, as is here expreſſed:

Edward ——	1	
Adam ——	1	more by 2.
Charles ——	2	more by 6.
	4	more by 8.

This 4 more by 8 ſhould be equal to 96, *Williams* age, had your ſuppoſition been right; but being it is not, take 8 out of 96, and there will remain 88; which divide by 4, and the Quotient will be 22, which is *Edwards* age.— Then according to the Queſtion, *Edward* being 22 years old, *Adam* muſt be 24 years old, which is as old as *Edward*, and 2 years more: then *Charles* muſt be

be 50 years old, which is as old as *Edward* and *Charles* together, and 4 years over. So all their ages added together, make 96 years, equal to *Williams* age, as here appeareth.

Edward	22
Adam	24
Charles	50
Williams age	96

QUEST.

QUEST. II.

Three Perſons, Andrew, Benjamin *and* Charles *are to go a Journey of* 235 *Miles*; *of this Journey*, Andrew *is to go a certain number of Miles unknown*; Benjamin *is to go four times as many Miles as* Andrew, *and three Miles more*; *and* Charles *is to go twice as many Miles as* Benjamin, *and five Miles more. How many Miles muſt each of theſe perſons travel ſeverally, to make out their Journey* 235 *Miles?*

SUppoſe that *Andrew* went only one Mile; then *Benjamin* muſt

must go four times as much, that is, 4 Miles, and 3 over: Then *Charles* must go twice as much as *Benjamin*, which is 8 Miles, and 5 over. These numbers added together, as here you see, make but 13 Miles, and 8 over: Whereas the sum of all their journey should be 235 Miles.

Andrew travelled 1 Mile.
Benjamin travelled 4 Miles, and 3 over.
Charles travelled 8 Miles, and 5 over.

The sum——— 13 Miles, and 8 over.

Wherefore, because your supposition was not right, substract the 8 over-Miles from 235 (the number of Miles they were to go in all) and the remainder will be 227; divide 227 by 13, and the

he Quotient will be $17\frac{6}{13}$; ſo that *Andrew* for his ſhare muſt travel 17 Miles, and $\frac{6}{13}$ of a Mile. And *Benjamin* muſt travel 4 times as much, which is $68\frac{24}{13}$, and 3 Miles more; and *Charles* muſt go twice as far as he, which is $136\frac{48}{13}$, and 5 Miles more. All which being added together, will make 235 Miles; as you may here ſee.

Andrew muſt go	$17\frac{6}{13}$	
Benjamin	$68\frac{24}{13}$	more 3
Charles	$136\frac{48}{13}$	more 5
The ſum	$221\frac{78}{13}$	more 8

Here the ſum is 221 Miles, and $\frac{78}{13}$, which makes juſt 6 Miles, and the 8 Miles more makes 235, which anſwers the Queſtion.

QUEST.

QUEST. 12.

The Captain, Lieutenant and Cornet of a Troop have taken amongst them from some Enemy 478 Crowns, which they agree to share in this manner: The Captain is to have 24 times as much as the Cornet, wanting onely 7 Crowns, and the Lieutenant is to have 5 times as much as the Cornet, wanting 3 Crowns. I demand how much the Cornet must have, and consequently the Lieutenant and Captain?

IMagine the Cornet to have onely 1 share, it matters not what:

what: then the Lieutenant muſt have 5 ſhares, wanting 3 Crowns; and the Captain muſt have 24 ſhares, wanting 7 Crowns: Add all theſe ſhares together, as here you ſee.

The Cornet 1 ſhare.
The Lieutenant 5 ſhares wanting
3 Crowns.
The Captain 24 ſhares wanting
7 Crowns.

The ſum is 30 ſhares wanting
10 Crowns.

This 30 ſhares wanting 10 Crowns ſhould be equal to 478: but being it is not, add the 10 Crowns to 478, and it makes 488; which divide by 30 (the ſum of the ſhares) and the Quotient will be $16\frac{8}{30}$ or $\frac{4}{15}$, which is the Cornets ſhare. Then the Lieutenants will be $77\frac{20}{15}$, which

is 5 times as much as the Cor-
nets, wanting 3 Crowns; and th
Captain must have $377\frac{96}{15}$, whic
is 24 times the Cornets share
wanting 7 Crowns: and thes
three sums added together, mak
$470\frac{120}{15}$; as in the Example.

The Cornet	$16\frac{4}{15}$
The Lieutenant	$77\frac{20}{15}$
The Captain	$377\frac{96}{15}$
The sum	$470\frac{120}{15}$

The Fractions make up
shares, (which you may finde b
dividing 120 by 15) which 8 be-
ing added to 470, maketh 478
the just sum to be shared.

QUEST

QUEST. 13.

A Drover driving of Sheep, one meets him, ſays, Good ſpeed friend with thy 20 Sheep. Nay, ſays the Drover, I have not 20 Sheep, but had I as many more, and half as many more, and two Sheep and half a Sheep, then I ſhould have 20 Sheep. How many Sheep had he in his Drove?

SUppoſe he had 1 Sheep, then as many more is 1, and half as many more is half a Sheep; that is 2 and an half; and 2

Sheep and an half more; add these together, thus:

1 Sheep.
1 as many more.
$\frac{1}{2}$ half as many more.
more $2\frac{1}{2}$ Sheep

The sum $2\frac{1}{2}$ more by $2\frac{1}{2}$.

This $2\frac{1}{2}$ more by $2\frac{1}{2}$ should b equal to 20, but it is too little wherefore, take $2\frac{1}{2}$ from 20, an there will remain $17\frac{1}{2}$; whic $17\frac{1}{2}$ being divided by $2\frac{1}{2}$, pro duceth in the Quotient 7: where fore he must have 7 Sheep in hi Drove.

7 Sheep.
7 as many more.
$3\frac{1}{2}$ half as many more
more $2\frac{1}{2}$ Sheep.

$17\frac{1}{2}$ more $2\frac{1}{2}$ is equal to 2 which was required.

QUEST

QUEST. 14.

There is 273 l. *to be divided amongst 4 Persons ; namely,* Andrew, Bennet, Christopher *and* Daniel.--- Andrew *is to have a share unknown.* Bennet *is to have twice as much as* Andrew, *and* 30 l. *more :* Christopher *is to have* 3 *times as much as* Andrew, *wanting* 52 l. *And* Daniel *is to have* 5 *times as much as* Andrew, *and* 20 l. *more.*-- *How must this* 273 l. *be divided amongst them, that every one have his true share ?*

Share.

SUppose *Andrew* to have 1 for his part.

Then *Bennet* must have 2, and 30 *l.* over.

And *Christopher* must have 3, lack 52 *l.*

And *Daniel* must have 5, and 20 *l.* over.

The sum of the shares is 11, lack 2 *l.*

 The

The reaſon why I ſay 11 *ſhares wanting* 2 l. *is becauſe* Bennet *and* Daniel *together have* 50 l. *over*, *and* Chriſtopher *wants* 50 l. *of* 3 *ſhares: therefore take their* 50 l. *from his* 52 l. *and there wants onely* 2 l.

Theſe 11 ſhares wanting 2 *l.* (by the tenor of the Queſtion) ſhould be equal to 273: but becauſe 2 *l.* is wanting of eleven ſhares, therefore add 2 *l.* to 273 *l.* and it will be 275 *l.* which theſe 11 ſhares ſhould be equal to; but being it is not, therefore divide 275 by 11, and the Quotient will be 25 *l.* for *Andrews* ſhare. Then,

Andrews

	l.
Andrews ſhare being	25
Bennets muſt be as much more, which is 50 *l.* and 30 *l.* more, in all	80
And *Chriſtophers* ſhare muſt be three times as much as *Andrews*; that is 75 *l.* wanting 52 *l.* that is	23
And *Daniels* muſt be 5 times *Andrews*, which is 125 *l.* and 20 *l.* more, in all	145
The ſum of the ſhares	273

Which is equal to the ſum to be divided, and is divided according to every punctilio of the Queſtion.

QUEST. 15.

A Master agrees with a Servant to work with him 30 days, agreeing to give him for every day that he wrought 7 s. and for every day that he idled, the Servant was to abate 5 s. At the expiration of the 30 days, they come to an account, that the Master and Servant were both even, neither to receive any thing. How many days did the Servant work? and how many did he play?

SUppose I D, for the days he laboured, comes to——7 *s.* Then he idled 29 days, which comes to——————145 *s.*

Now

Now (because the money that his labour came to, and the money that he loſt by neglect, came to the ſame; therefore add 5 *s.* (which he was to allow every day he neglected) to both the above-ſuppoſed numbers, and they make 12 and 150: therefore divide 150 by 12, and you ſhall have in the Quotient $12\frac{1}{2}$, and ſo many days he laboured; which being ſubſtracted from 30, the whole number of days, there remains $17\frac{1}{2}$, for the days he idled; for 12 days and an half, at 7 *s.* a day, comes to 4 *l.* – 7 *s.* – 6 *d.* alſo 17 days and an half which he idled, at 5 *s.* a day, comes to the ſame ſum; which declares the work to be true.

QUEST. 16.

A Dog is purſuing of a Hare, which is 100 *yards before him; and for every yard that the Hare runs, the Dog runs two yards and an half (that is, the Dog runs two times and an half ſwifter than the Hare.) I would know how many yards the Hare hath run when the Dog overtaketh her?*

PUt for the yards (1 Y) (or any other Mark or Letter;) therefore the yards are (100 more 1 Y;) and becauſe the Dog runs twice and an half faſter then the

the Hare, take any two numbers in like proportion, as $2\frac{1}{2}$ is to 1, which will be 5 and 2, (for 1 doubled makes 2, and $2\frac{1}{2}$ doubled makes 5:) these numbers thus found, there is the same proportion between (100 more 1 Y) to (1 Y) as there is between 5 and 2: Wherefore multiply (100 more 1 Y) by 2, the product is (200 more 2 Y) which is equal to (1 Y and 5:) wherefore, if you substract 2 from 5, there will remain 3; and divide 200 by 3, the Quotient will be $66\frac{2}{3}$. Therefore I say, that the Hare will have run 66 yards and $\frac{2}{3}$ of a yard (which is 2 foot) when the Dog shall have overtaken her; and the Dog will have run $166\frac{2}{3}$ yards, which is twice and an half more than the Hare, for twice $66\frac{2}{3}$, and $33\frac{1}{3}$, which is half $66\frac{2}{3}$ is equal to $166\frac{2}{3}$, the quantity that the Dog ran.

QUEST.

QUEST. 17.

There are two Messengers set out from two Towns, which are 140 Miles asunder, upon one and the same day: The one travels 8 Miles a day, and the other 6 Miles. I demand how many days it will be ere they meet together.

PUt one D (or day) for the time they shall meet; in which time the one would have travelled but 8 Miles of the Journey, and the other but 6 Miles; these added together, make but 14 Miles; whereas they should have travelled 140 Miles: divide therefore

herefore 140 by 14, and the Quotient will be 10; ſo that in 10 days they will meet together: which may thus be proved.

He that travels 8 Miles a day, will in 10 days have travelled 10 times 8 Miles, that is 80 Miles. And

He that travels but 6 Miles a day, will in 10 days travel 6 times 10 Miles, that is 60 Miles

Theſe two numbers, 60 and 80, being added together, make 140 Miles, equal to the diſtance of the two Towns.

QUEST.

QUEST. 18.

A Foot-man goes a Journey undertaking to go every day nine Miles: when he had been gone 10 *days more expedition was required, and a Horse-man is sent after him. How many Miles in a day must the Horse-man ride to overtake the Foot-man in* 18 *days?*

FOr the Miles that the Horse-man is to ride, suppose one part of the Journey, (or 1 M:) therefore in 18 days he would have travelled 18 M. Now for that the Foot-man travelling every day 9 Miles, he went in 18 days

ays 162 Miles; to the which add o Miles, which he went in the o days that he ſet out before he Horſe-man, and the ſum is 52 Miles. Now if you divide 52 by 18 M, you ſhall have in he Quotient 14: And ſo many Miles muſt the Horſe-man travel in a day, to overtake the Foot-man in 18 days.--- For if you multiply 18 by 14, the product will be 252, equal to the Miles the Foot-man travelled in 28 days.

QUEST.

QUEST. 19.

One buys 100 *Turkeys for* 17 *pound, in the selling of which again, he loseth* 18 *pound in his laying out of* 102 *pound. I would know how many Turkeys he sold for one pound.*

IMagine that he sold one Turkey for one pound: Then work by the Rule of Three, thus:

If 17 *l.* buy 100 Turkeys, how many will 102 *l.* buy?

Multiply 102 by 100, and the product will be 10200, which divide by 17, and the Quotient will be 600.

Then

Then ſay again by the Rule of Three,

As 1 *l.* is to 1 T. ſo is 102 *l.* wanting 18 *l.* which he loſt, that is, 84 *l.* to 84.

Here the determination of the Queſtion will be between 600, the firſt Quotient, and 84 the laſt Quotient.

Divide therefore 600 by 84, and the Quotient will be $7\frac{1}{7}$ T: and ſo many Turkeys he ſold for one pound.

It may thus be proved by the converſe working: For,

If $7\frac{1}{7}$ Turkeys coſt 1 *l.* what will 600 Turkeys coſt? Multiply and divide, you will finde 84 *l.* which is 18 *l.* leſs then 102 *l.* which he laid out.

QUEST.

QUEST. 20.

One bought 8 yards of two sorts of Stuff, as Calico and Tammy, for 20 s. the Tammy cost 4 s. a yard, and the Calico 2 s. How many yards did he buy of each sort?

TO anſwer this, or the like Queſtion, multiply 8 (the whole number of yards) by 2 (the leaſt price) it produceth 16, which ſubſtract from 20 (the whole price) the remainder will be 4, which divide by 2, (the difference of the price,) and the Quotient will be 2 for the number of yards of Tammy, and

and then there must be 6 yards of Calico. For,

2 Yards of Tammy at 4 *s.* is
——————————8 *s.*
And 6 Yards of Calico at 2 *s.* is
——————————12 *s*

In all——20 *s.*

QUEST.

QUEST. 21.

There are four ſorts of Mony, of which of one ſort 7 pieces makes a pound Sterling: Of the ſecond ſort, 18 pieces makes a pound: Of the third ſort, 21 pieces makes a pound: And of the fourth ſort, 28 pieces makes a pound. Of each of theſe pieces, a Merchant received in exchange a like number, all of them making 568 pound Sterling. I demand how many pieces there were in all? and how much mony he had of each ſeveral piece?

PUt (or imagine) 1 P, for the quantity of each ſeveral ſort of

of Mony. Now because to a pound Sterling there went 7 pieces of the first, apply your self to the Rule of Three in this manner, saying,

If 7 pieces of Mony be worth 1 P.

If 7 P be worth 1 *l.* what is 1 P worth? The answer will be, $\frac{1}{7}$ of a pound. Then again,

If 18 P be worth 1 *l.* what is 1 P worth? Answer, $\frac{1}{18}$ of a pound. Again for the third sort,

If 21 P be worth 1 *l.* what 1 P? Answer, $\frac{1}{21}$ of a pound.

Lastly, if 28 P be worth 1 *l.* what 1 P? Answer, $\frac{1}{28}$ of a pound.

Now these Fractions do make together $\frac{71}{2352}$, which should be equal to 568. But seeing it is not, divide therefore 568 by $\frac{71}{2352}$, and you shall finde 2016, which is the value of 1 P: and so many of

each

each of the pieces he was to re-ceive to make up his sum of 568 *l.* Sterling, which may be easily thus proved.

	l. ſt.
If 7 pieces are worth	——1
What are 2016 worth?	—288
If 18 pieces are worth	——1
What are 2016 worth?	—112
If 21 pieces are worth	——1
What are 2016 worth?	——96
If 28 pieces are worth	——1
What are 2016 worth?	——72

Here you ſee, that	*l.*
2016 of the firſt pieces make--	288
As many of the ſecond———	112
As many of the third-———	96
And as many of the laſt———	72
Which added together, make-	568

Equal to the Mony changed, and ſo is the Queſtion anſwered.

QUEST.

QUEST. 22.

There is an Army, whose Foot are 8 times the number of the Horse: Amongst them there is 392000 Dollers to be distributed; so that each Horse-man is to have 16 Dollers, and each Foot-souldier 5 Dollers. I demand, of how many Horse and how many Foot the whole Army consisted?

IMagine the Horse-men to be one, or (1 H).

And the Foot to be eight, or (8 F) because they are, (according to the Question) to be 8 times as many as the Horse. Now (because each Horse-man is

is to have 16 Dollers) multipl
16 by 1 H, and it makes 16 H
Likewise, because each Foot-ma
is to have 5 Dollers, multipl
5 by 8 F, and it makes 40 F
add 16 H and 40 F together, the
make 56, which should be equ
to 392000 Dollers; but being
is not, divide 392000 by 56, an
the Quotient will be 7000, fo
the number of Horse-men; an
that multiplyed by 8, givet
56000, for the number of Foot.

Now if you multiply 7000 b
16, the product will be 17200
for the number of Dollers to b
distributed to the Horse-men
and multiplying 56000 by 5, th
product will be 280000 for th
number of Dollers that the Foot
men are to have; and the
two added together, mak
392000, equal to the number o
Dollers to be distributed, and a
swers the Question in all its pa
culars.

QUEST

QUEST. 23.

An Hegler goes to a Country-Market & buys 100 Eggs, which is 120) after the rate of 3 for a penny. At another Market he buyes 120 more at the rate of 2 for a penny; these Eggs he mingles together, and sells his 240 Eggs at another Market after the rate of 5 Eggs for two-pence. I demand, whether he lost, gain'd, or saved by this bargain?

ACcording to common acceptation, any person unacquainted with Arithmetick, would conclude that (besides his

Journeying from Market to Market) he loſt nothing, nor gained nothing. But by Arithmetical proof, you ſhall find that he loſt not only his Travel, but Money alſo.

For, by the common Rule of Three, you ſhall find, That if 3 Eggs coſt one penny, 120 will coſt 3*s.* 4*d.* for divide 120 Eggs by 3 Eggs, and there will be in the quotient 40 pence, which is 3*s.* 4*d.*

Likewiſe, by the ſame Rule, you ſhall find, That 120 Eggs at 2 for a penny, will come to 5*s.* for divide 120 by 2, and the quotient will be 60 pence, or 5 *s.*

So that theſe two ſums, *viz.* 3 *s.* and 4 *d.* and 5 *s.* do make together 8 *s.* and 4 *d.* and ſo much did his 240 Eggs coſt him at both Markets.

But

But now to ſee whether he gained or loſt: Say by the ſame Rule of Three;

If 5 Eggs coſt 2 pence, what ſhall 240 coſt?

Multiply 240 by 2, it produceth 480, which divide by 5, and in the quotient you ſhall find 96 pence, which is but 8 ſhillings: So that beſides all his Travel, he loſt 4 pence in Money.

QUEST. 24.

One comes to a Draper, and demands the Price of a yard of Canvas; the Draper demands 12 d. *Sayes the Chapman, I will willingly give you Two shillings for every yard I buy of you; provided, that every Angel of my Money may go for Twenty shillings: To which the Draper Assents.*

This is rather a Fallacy than any thing else; but I have here inserted it, to shew the cunning reach of some persons, over the honest meaning of others.

The

The Draper and Chapman having thus agreed, the Chapman bids the Draper cut him off Five yards, which at 2 *s.* the yard comes to 10 *s.* The Chapman throws him down an Angel, (which by their agreement was to go for Twenty shillings) and demands the rest again, which was Ten shillings. So that by this reaching trick, he would have had his 5 yards of Canvas of the Draper for nothing.

QUEST. 25.

There are 100 Stones which lie 3 foot or one yard upon the ground one from the other; and there is one employed to gather up these Stones one by one, and bring them to a Basket which standeth 3 foot from the first Stone. How many Yards of ground must he go backwards and forwards in all, before he hath brought the last Stone to the Basket?

THe number of Stones being 100, and the Basket standing one yard forward of the first Stone, makes in all 100 yards in

in length: wherefore to effect this,——Add 1 to the number of yards, it makes 101, which multiply by half the number of yards, which are 50, the product will be 5050: which shews that he must go forward 5050 yards; then must he go backwards as much, which is Ten thousand one hundred yards; which is 5 miles and three quarters, wanting only 20 yards.

QUEST. 26.

THE FISHER-MAN'S QUESTION.

I caught a Fish *(others among)*
Whose Head *was full 5 foot long,*
And his Tayle *was (truly)*
As long as his Head, *and half his*
And his Body*(without fail)* (Body
was just as long as his head *&* tail.

This is my Question,
resolve it who can;
How long was the Body,
And Fishes Tail *than?*

MUltiply the length of the Fishes Head by 3, by 4, and

and by 8; the one product shall be the length of the Tail, the other the length of the Body; and the third, shall be the length of the whole Fish.

So the Head being 5 foot, this multiplyed by 3, giveth 15 foot for the length of the Tail.

Again, Multiply 5 by 4, it produceth 20, for the length of the Body.

And lastly, Multiply 5 by 8, it produceth 40, for the length of the whole Fish; and exactly answers the *Question* in all its particulars.

For the Head being 5 foot, and the Tail 15 foot, and the Body 20 foot;

The Tail 15 foot, is equal to the whole Head 5 foot, and half the Body 10 foot: For 5 and 10 is 15.

And the Body 20 foot, is equal to 15 foot the Tail, and 5 foot the Head.

And these together make 40 foot, the length of the whole Fish.

QUEST. 27.

There is a Steeple, the top whereof casteth its shadow upon the ground 260 foot from the bottom thereof: At the same time as you measure the shadow, the length of the shadow of your Two-foot Rule is 3 foot: I demand how high this Steeple is?

THis Question is easily answered by the Rule of Three: but I here insert it with some others, to shew how serviceable Numbers, and the right under-

understſtanding of them, are applicable to all ſorts of men and things. To effect this, this is the proportion:

As the length of the ſhadow of your Rule 3 foot, is to the length thereof 2 foot:
So is the length of the ſhadow of the Steeple 260 foot, to the height of the Steeple $86\frac{2}{3}$.

Wherefore, multiply 260 foot, the length of the ſhadow of the Steeple, by 2 foot, the length of your Rule, and the product is 520 foot; which divide by 3, the length of the ſhadow of your Rule, and the quotient will be $86\frac{2}{3}$, that is, 86 foot, and two third parts of a foot, which is 8 inches; ſo that the Steeple is 86 foot, and 8 inches high.

QUEST,

QUEST. 28.

There is a Fountain which hath 4 Streams; in the Cistern whereof there is contained 8 Barrels of water: if the least of the streams be only opened, the water will be 6 hours in running out: if the second, it will be 4 hours running out: If the third be opened, it will be 3 hours running out: and if the fourth and greatest be set running, it will run the water out in 2 hours. I would know in what time all the water would run out if all the 4 streams were set running together?

BEcause the least Stream will vent all the water in 6 hours, it

it muſt therefore vent 8 Barrels in 6 hours; and the Second Stream would run 12 Barrels, the Third 16 Barrels, and the biggeſt 24 Barrels.

Leaſt Stream	8
Second	12
Third	16
Biggeſt	24
In all	60

Then ſay by the Rule of Three,

If 60 require 6, what will 8 require?

Multiply 6 by 8, it produceth 48, which ſhould be divided by 60; but it being above 48, it is therefore $\frac{48}{60}$, or $\frac{4}{5}$ of an hour.

And in that time will all the water run out of the Fountain, if all the 4 Streams were ſet running together.

QUEST.

QUEST. 29.

A man dying, leaves his Wife with Child of her first; and by Will bequeathed his Estate, which amounted to 2600 l. conditionally thus, That if the Child his Wife went withal were a Woman-kind, that then his Wife should have two Thirds thereof, and the Child the other Third: But if she should be delivered of a man-child, then the Child was to have two Thirds, and his Wife the other Third. But after the Decease of the Father, the Mother was delivered of two Sons and a Daughter. In what nature shall this Estate be parted amongst them, according to the Testators Will?

IT is evident, by the Will of the Deceased, that for every Third

that

that the Daughter was to have, the Mother was to have two Thirds: And that the Son was to have double to the Mother.

Obſerving this Order; if you allow to the Daughter 1 *l.* then the Mother muſt have 2 *l.* and either of the Sons muſt have twice as much as the Mother, that is 4 *l.* apiece. Wherefore for the two Sons put down 4 *l.* and 4 *l*; for the Mother 2 *l.* and for the Daughter 1 *l.* in this order:

	l.
The two Sons	4
	4
The Mother	2
The Daughter	1
The Sum	11

Then

Then say by the Rule of Three direct,

If 11 *l.* the Sum of all the portions, requires 2600 *l.* what shall 4 *l.* (which is one of the Sons shares) require?

Multiply 2600 by 4, the product will be 10400, which divided by 11, the quotient will be 945 *l.* $\frac{5}{11}$, for one of the Sons shares: So then the other Son must have as much; and the Mother half as much; namely, 472 $\frac{8}{11}$: and the Daughter must have half as much as the Mother, namely, 236 $\frac{4}{11}$; all which being added together, make 2600 *l.* equal to the whole Estate; and answers the Will of the Testator in all particulars.

The

The two Sons	$945\frac{5}{11}$
	$945\frac{5}{11}$
The Mother	$472\frac{8}{11}$
The Daughter	$236\frac{4}{11}$
	$2600\frac{22}{11}$

QUEST.

QUEST. 30.

The Grand-father, the Father, and the Son met together, and ſpent 20 s. *When the Reckoning came to be paid, the Grand-father would pay one Half, the Father one Third, and the Son one Quarter. How much muſt every one pay of this Reckoning?*

TO reſolve this, If the Grand-father ſhould pay $\frac{1}{2}$, which is 10 *s.* and the Father $\frac{1}{3}$, which is 6 *s.* 8 *d.* and the Son $\frac{1}{4}$, which is 5 *s.* the Reckoning would be over-paid: for theſe three added together, make 21 *s.* 8 *d.* and they ſhould pay but 20 *s.*

Where-

Wherefore you must work otherwise; as thus, Reduce $\frac{1}{2}$, $\frac{1}{3}$, $\frac{1}{4}$, into one denomination, by multiplying the denominators one into another; saying, 2 times 3 is 6, and 4 times 6 is 24, which 24 is a new denominator. Then the $\frac{1}{2}$ of 24 is 12: and $\frac{1}{3}$ of 24 is 8: and $\frac{1}{4}$ of 24 is 6; the sum of them is 26, ——And this 26 is your first number in the Rule of Three: ———20 s. (which they spend) must be the second number: ———And 12, 8, and 6 must be the three third Numbers: ———Wherefore say,

I. *If* 26 *pay* 20 s. *what must* 12 *pay?*

Multiply 20 by 12, it produceth 240; this divided by 26, giveth in the quotient 9 s. $\frac{6}{26}$ for the Grand-fathers part.

II. *If*

II. *If 26 pay 20 s. what must 8 pay?*

Multiply 20 by 8, the product is 160; which divide by 8, and the quotient will be 6 *s.* $\frac{6}{26}$: And so much must the Father pay.

III. *If 26 pay 20 s. what must 6 pay?*

Multiply 20 by 6, it giveth 120; which divided by 26, gives in the quotient 4 *s.* $\frac{16}{26}$: And so much must the Son pay.

		s.	*d.*	*q.*
The Grand-father must pay		9 $\frac{6}{26}$		
	Equal to ——	9	2	$3\frac{5}{}$
The Father must pay ——		6 $\frac{6}{26}$		
	Equal to ——	6	1	3
The Son must pay ——		4 $\frac{16}{26}$		
	Equal to ——	4	7	2
	In all ——	20	0	0

QUEST.

QUEST. 31.

here are Four Cities or Towns ly-ing one from the other in a right Line; and the two farthermost are distant one from the other 56 miles: And the distance from the Third to he Fourth, is as much as from the irst to the Second, with half as nuch as between the Second and he Third: And the distance be-ween the Second and Third is as nuch as the distance between the irst and Second, with the Third nd Fourth together. How far vere each of the Towns distant one rom the other?

Et the Four Cities or Towns be A B C D.

7 B 28 C 21 D

——2——————3———4

Because

Becauſe the diſtance betwe the Third and Fourth, with th diſtance between the Firſt & S cond, is equal to the diſtance be tween the Second and Third Therefore divide 56 (the who diſtance) by 8, and the quotie will be 7; wherefore the diſtan between the Firſt and Secon Town is 7 miles.

Again, it is evident, that th diſtance between the Third an Fourth muſt be three times far, that is 21 miles. And the d ſtance between the Second an Third being equal to both the muſt be 28 miles.

So is CD diſtant as far as A and half BC.
And BC is diſtant as far as A and CD together.
And AD is diſtant 56 miles.

QUES

QUEST. 32.

Two Ships *ſet ſail at one time; the one ſails directly East, 74 Leagues: The other ſails directly* North, *62 Leagues: I would know how many Leagues theſe two* Ships *are aſunder?*

Multiply 74 by 74, the product will be	5476
Alſo Multiply 62 by 62, the Product is ——	3844
Theſe two Numbers added together, make——	9320

Of this Number 9320, extract the ſquare Root, and you ſhall find it to be almoſt 97: And ſo many Leagues are the two Ships aſunder

QUEST.

QUEST. 33.

There was a May-pole, whic in a windy night was bro- ken, so that the top there- of lit upon the ground 3 foot distant from the bot- tom thereof; and the piec which was broken off wa 50 foot long: At wha length was the May-pol broken off, and how hig was it in all?

MUltiply 50 (the length o the piece broken off) i it self; that is, Multiply 50 b 50, it makes 2500. Likewi multiply 30 (the distance whic it fell from the bottom) by 3 the Product is 900; Substra

90

900 from 2500, and there remains 1600: Extract the ſquare Root of 1600, and you will find it to be 40; ſo that there is 40 foot of the May-pole ſtanding: and 50 being broken off, makes 90; ſo that the May-pole was 90 foot high.

E QUEST.

QUEST. 54.

There is 160l. *to be distributed amongst a number of poor People; some are to have shillings, some six-pences, some Groats, and some Three-pences: How many poor People will this relieve, so that the number of those that receive shillings, six-pences, groats, and three-pences, shall be equal?*

TO effect this, reduce the 160*l.* into pence; it maketh 38400 pence for your dividend. Then add 12 *d.* 6 *d.* 4 *d.* and 3 *d.* together, they make 25 *d.* and this is your Divisor.

Then

Then divide 38400 (the pence in 160*l.*) by 25 (the ſum of the ſhares) and in the quotient you ſhall find 1536; and ſo many poor people muſt there be of a ſort: which you may eaſily thus prove: For,

			l. s. d.
1536	Shillings	is	76-16-0
	Six-pences		38-08-0
	Groats		25-12-0
	three-pences		19-04-0
	In all		160-00-0

Now if you would know how many Poor there were in all, Multiply 1536 by 4, and the quotient will be 6144; and ſo many poor People muſt there be in all, to receive this Legacy.

QUEST. 33.

There was a May-pole, which in a windy night was broken, so that the top thereof lit upon the ground 30 foot distant from the bottom thereof; and the piece which was broken off was 50 foot long: At what length was the May-pole broken off, and how high was it in all?

MUltiply 50 (the length of the piece broken off) in it self; that is, Multiply 50 by 50, it makes 2500. Likewise multiply 30 (the distance which it fell from the bottom) by 30 the Product is 900; Substract

90

900 from 2500, and there remains 1600: Extract the ſquare Root of 1600, and you will find it to be 40; ſo that there is 40 foot of the May-pole ſtanding: and 50 being broken off, makes 90; ſo that the May-pole was 90 foot high.

E QUEST.

QUEST. 54.

There is 160l. *to be distributed amongst a number of poor People; some are to have shillings, some six-pences, some Groats, and some Three-pences: How many poor People will this relieve, so that the number of those that receive shillings, six-pences, groats, and three-pences, shall be equal?*

TO effect this, reduce the 160*l.* into pence; it maketh 38400 pence for your dividend. Then add 12 *d.* 6 *d.* 4 *d.* and 3 *d.* together, they make 25 *d.* and this is your Divisor.

Then

Then divide 38400 (the pence in 160*l.*) by 25 (the ſum of the ſhares) and in the quotient you ſhall find 1536; and ſo many poor people muſt there be of a ſort: which you may eaſily thus prove: For,

			l. s. d.
1536	Shillings ——	is	76-16-0
	Six-pences —		38-08-0
	Groats ——		25-12-0
	three-pences		19-04-0
	In all		160-00-0

Now if you would know how many Poor there were in all, Multiply 1536 by 4, and the quotient will be 6144; and ſo many poor People muſt there be in all, to receive this Legacy.

QUEST. 35.

How many perſons will there be required to receive 2880 *Pence, ſome receiving* 6 d. *ſome* 5 d. *ſome* 4 d. *ſome* 3 d. *ſome* 2 d. *and ſome* 1 d. *there being a like number of each ſort?*

IF you add *6d*. *5d*. *4d*. *3d*. *2d*. & *1d* together, they make 21 *d*. by which, if you divide 2880, the quotient will be $137\frac{1}{7}$; and ſo many perſons muſt there be of a kind: which is thus proved:

For,

For,

			l. *s.* *d.*
137	Six-pences —	is	3- 8--6
	Five-pences-		2-17--1
	Groats ——		2- 5--8
	three-pences		1-14--3
	Two-pences		1- 2-10
	Pence ——		0-11--5
	In all ——		11-19--9

This 11 *l.* --19 *s.* --9 *d.* ſhould have been 12 *l.* equal to 2880 pence; but by the former work you ſee that when you divide 2880 by 21, there remained $\frac{7}{21}$, or $\frac{1}{7}$ (which is all one) now this $\frac{7}{21}$ becomes to be $\frac{21}{7}$ of a peny, which is equal to 3 *d.* wherefore if you add 3 *d.* to 11 *l.* --19 *s.* --9 *d.* the ſum will then be 12 *l.* or 2880 *d.*

QUEST. 36.

There are 1000 *Loaves of Bread to be divided a-mongst* 3 *sorts of Persons; those that were above* 40 *years of age, were to have* 12 *penny loaves, those a-bove* 20 *years of age were to have* 6 *penny loaves, & those above* 10 *years of age were to have penny loaves. How many* 12 *penny loaves, how many* 6 *penny, and how many penny loaves must there be provided?*

The excess is $\left\{\begin{matrix}40\\20\\10\end{matrix}\right\}$ for the $\left\{\begin{matrix}1\\2\\3\end{matrix}\right\}$ sort of persons

The sum—70

By the Rule of Three say,

(1) *If* 70 *require* 1000, *what shall* 40?

Multiply 1000 by 40, it produceth 40000; which divide by 70, the quotient will be $571\frac{3}{7}$, and so many 12 penny loaves must be provided.

(2) *If* 70 *require* 1000, *what shall* 20?

Multiply 1000 by 20, it produceth 40000; that divided by 20 produceth $285\frac{5}{7}$, so many 6 penny loaves.

(3) *If* 70 *require* 1000, *what shall* 10?

Multiply 1000 by 10, it produceth 10000; this divided by 70 produceth $142\frac{6}{7}$, and so many penny loaves must be provided: which added together, (the fraction-parts excepted) make 1000 loaves.

QUEST. 37.

A Debtor ows his Creditor a certain ſum of money, of which, becauſe he cannot make one entire payment, condeſcends to pay it by the weeks in the year, according to this progreſſion, namely, to pay the firſt week 5 s. *the ſecond week* 10 s. *the third week* 15 s. *&c. I would know how much the Creditor received of his Debtor at the years end?*

TO perform this eaſily (for to add 5 *s.* 10 *s.* 15 *s.* 20 *s.* till you come to the end of the 52 weeks,

weeks, which make a year, would be tedious) do thus;

First multiply 52 (the number of weeks in the year) by 5 (the increaſe every week) 260, which is equal to the two and fiftieth number, if you had added the ſums together.

Secondly, to this 260, add 5 (the increaſe for one week) it maketh 265, which multiply by 26 (half the number of weeks in the year) and it produceth 6890 ſhillings, which is 344 *l.* 10 *s.* and ſo much will the Creditor have received of his Debtor at the years end.

QUEST. 38.

A certain person by Will, bequeaths his Estate to his Executor, enjoyning him every year (so long as the Executor lived) to bestow on certain charitable uses by him named, a certain sum of Money, increasing every year 55 l. *more then the preceding ; so the first year the Executor expended* 55 l. *and the last year* 495 l. *How many years lived the Executor after the Donor ? and how much to the fore-mentioned Uses did he expend ?*

TO effect this easily, First, Substract 55 *l.* (the first disbursment) from 495 *l.* (the last disbursment) the remainer is 440 *l.* which divide by 55 (the Excess

Exceſs or increaſe of every years disburſment) and the quotient will be 8, to which add 1, and it makes 9 ; and ſo many years lived the Executor after the Deceaſed.

Secondly, Multiply 55 (the Exceſs) by 9 (the number of years) the quotient will be 495, which was the laſt disburſment.

Thirdly, add 495 and 55 together, they make 550, which multiply by $4\frac{1}{2}$ (which is half the number of years the Executor lived) and the product will be 2475 ; and ſo much did the Executor expend in all.

QUEST.

QUEST. 39.

A Father gave to his eldest Son 252 l. and to his youngest he gave but 28 l. and to every Son successively from the youngest he gave 28 l. more than to the other. How many Sons had the Father? and how much Money did all their Legacies amount unto?

FIrst take 28 (the youngest Sons share) from 252 (the eldest Sons share) the remainer will be 224. which divide also by 28 (because every Sons portion exceeded others by 28 *l.*) and the quotient will be 8, to which add 1. (for the first Son) and it makes

makes 9; so that he had 9 Sons.

Now to find what sum of Money all their Legacies amounted unto; add 28 (the youngest Sons share) to 252 (the eldest Sons share) and the sum will be 280; which being divided by $4\frac{1}{2}$ (which is half the number of the Sons he had) the Product will be 1260 *l.* and so much Money did all their Portions amount unto.

QUEST.

QUEST. 40.

A Bishop dying, left 10000 l. *to be distributed amongst three sorts of Men, viz. Divines, Lawyers, and Physicians, in such order, that* 40 *Divines were to have* 10 l. *the Lawyers* 5 l. *the Physicians* 1 l. *And* 60 *Physicians were to have their parts out of the Legacy also. I would know what the Divines, Lawyers, and Physicians share will be? And also what will the Portion or share of every Divine, Lawyer and Physician be?*

FIrst Multiply 40 (the Divines) by their Excess (which is

is 10 *l.*) and it produceth 400.

Secondly, Multiply the 50 Lawyers by 5 (which is their excess) and it produceth 250.

Thirdly, Add these two numbers together, *viz.* 400, and 250, and they make 650, which with the 60 Physicians make 710, the total, as here you see;

Divines	400
Lawyers	250
Physicians	60
In all	710

Being thus prepared, say by the Rule of Three direct thus;

If 710 persons have 10000 *l.* amongst them, how much shall 400 persons have?

First, for the Divines.

Multiply 10000 by 400, it produceth 4000000; which divide by 710, and the quotient will be

be 5633 *l.* and $\frac{57}{71}$ of a pound; ſo that the 140 Divines ſhares will come to 5633 $\frac{57}{71}$ *l.*

Secondly, for the Lawyers.

Multiply 10000 by 250, the Product will be 2500000, which divide by 710, and the quotient will be 3591 *l.* and $\frac{9}{71}$ of a pound; ſo that the 250 Lawyers will have 3591 $\frac{9}{71}$ *l.* for their ſhares.

Thirdly, for the Phyſicians.

Multiply 10000 by 60, the product will be 600000, which divide by 710, and the quotient will be 845 and $\frac{5}{71}$ of a pound. So that the 60 Phyſicians will have for their ſhares 845 $\frac{9}{71}$ *l.* All which ſhares being added together, do make up the juſt ſum of 10000 *l.* As here you ſee.

400 Divines———	5633 $\frac{57}{71}$
250 Lawyers———	3521 $\frac{9}{71}$
60 Phyſicians———	845 $\frac{5}{71}$
	10000

Having

Having thus found the general ſhares, it will be now requiſie to find every Particular ſhare: and First, *for every Divines ſhare, ſay,*

If 40 Divines have 5633 $\frac{57}{71}$ *l.* what ſhall one have?

Divide 5633 $\frac{57}{71}$ *l.* which is 5633 *l.* --16 *s.* --0 --2 *q.* $\frac{50}{71}$. by 40, the quotient will be 140 *l.* --16 *s.* --0 *d.* --3 *q* $\frac{19}{71}$. for every Divines ſhare.

Secondly, *for every Lawyers ſhare.*

Divide 3521 $\frac{9}{71}$, which is 3521 *l.*-- 2 *s.* --6 *d.* --1 *q.* $\frac{49}{71}$, by 50, the quotient will be 70 *l.* --8 *s.* --5 *d.* --1 *q.* $\frac{46}{71}$. for every Lawyers ſhare.

Thirdly, *for every Phyſicians ſhare.*

Divide 845 $\frac{5}{71}$, which is 845 *l.* 1 *s.* --4 *d.* --3 *q* $\frac{43}{71}$, by 60, the quotient will be 14 *l.* --1 *s.* --8 *d.* 1 *q* $\frac{9}{71}$, for every Phyſicians ſhare.

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A SUPPLEMENT to the foregoing QUESTIONS.

THe *foregoing* 40 Questions *not of themselves being sufficient to make a Treatise answerable, in bulk, to the* Stationers *desire; I have therefore, for his satisfaction, added the particulars following, (being no less useful then profitable, and altogether as Recreative and delightful, as the former) namely,*

namely, Ten Queſtions, *put by way of* Propoſition, *with the* Anſwers *of them, which will give ſufficient light to the Practitioner, to reſolve, and confirm him in the reſolving of the like, when they ſhall be propoſed to him.* -----*After theſe* Propoſitions, *I have added (by way of Diſcourſe) ſeveral* Agreements *and* Contracts *between party & party, ſeeming fair and reaſonable at the propoſing, which the ſubtilty of Numbers diſcovers to be either* impoſſible *in the performance, or* fallacious *in the intent of the party that offers them.* -----*Likewiſe, I have declared the* ſubtilty, propriety,

propriety, *and* secret harmony *that there is in some Numbers, both in themselves, and being joyned with others.* ----- *And to conclude all, I have added diverse* Compendiums in Arithmetick, *which will be of good use, and ease you in many Arithmetical performances.*

Vale.

APPEN-

Appendix.

TO the foregoing *Questions*, I will here add certain *Propositions*, and give the *Answers* of them in general terms, leaving the Arithmetical Working of them to the ingenious Practitioner, thereby the better to confirm him in his undertakings, to resolve other *Questions* that may be proposed to him.

PRO-

PROPOSIT. I.

here were 6 Cups *of Gold which weighed together* 600 *ounces, but each* Cup *was heavier than the other by one ounce; now how much did each* Cup *weigh severally?*

sw. ONe (and the least of the Cups) weighed ounces and a half; the next and a half, the third 99 and half, the fourth 100 and a half, e fift 101 and a half, and the t and biggest weighed 102 nces and a half; all which mbers being put together, ke 600 ounces, equal to the hole weight.

PROP.

PROP. II.

There are Four ſeveral Meaſures, as A. B. C. D. *of which* D *holds* 24 *pints, and* C *holds as much again as* B, *and* 3 *times as much as* A; *and* D *with twice* A, *will hold double as much as* C, *and four times as much as* B. *How much did every one of theſe Meaſures hold ſeverally?*

A*Nſwer.* A holds 6 pints,
D 24
C 18
B 9

So that C holds as much again as B, and three times as much as A, and D with twice A, holds as much as C, and four times as much as B.

PROP. III.

A Father leaves 1000 l. to be disposed of to his Son and Daughter, conditionally thus; That the fifth part of that which his Son should have, should exceed the fourth part of that which the Daughter should have, by 10 l. What must each have?

Answ. THe Son had 577 *l.* and $\frac{7}{9}$ of a pound; and the Daughter 422 *l.* and $\frac{2}{9}$ of a pound. Now the fifth part of $577\frac{7}{9}$ is $115\frac{5}{9}$; —And the fourth part of $422\frac{2}{9}$ is $105\frac{5}{9}$, which is less then $115\frac{5}{9}$ by 10: ——And $577\frac{7}{9}$ and $422\frac{2}{9}$ being added together, do make 1000 *l.* equal to the whole Legacy.

PROP. IV.

One coming into an Orchard, asked the Gardner how many Trees there were in that Orchard? The Gardner answered, That the one half of the trees were Apple-trees, the Quarter-part Pear-trees, the ſeventh-part were Plumb-trees, & that there were 12 Cherry-trees beſides. How many trees were there in this Orchard?

Anſw. THere were 112, the half whereof is 56, the quarter thereof is 28, and the ſeventh part is 16; theſe three numbers added together, make 100, which with the 12 Cherry-trees make in all 112 Trees in the Orchard.

PROP. V.

Two Perſons, as James *and* Paul, *had between them a certain number of Sheep in two Droves;* James *ſaid to* Paul, *If you put* 70 *of your Sheep into my drove, I ſhall have three times as many Sheep as you have: ---But* Paul *ſaid to* James, *If you put* 70 *of yours into my drove, I ſhall have five times as many as you. How many Sheep had each of them?*

Anſw. J*Ames* had 110, and *Paul* had 130, ——For if you

take 70 from *Paul* and add them to *James*, then *James* will have 180, and *Paul* but 60, which is but one third part of what *James* hath: ——But if you take 70 from *James* and give them to *Paul*, then *Paul* will have 200 and *James* but 40, which is but one fifth part of what *Paul* hath.

PROB

PROP. VI.

The Father and Son travelling together, each of them carrying a certain number of Bottles of Wine; the Son complains to the Father, that he was over-laden: the Father replied, If I ſhould take one of your Bottles, then I ſhould have as many more Bottles as you have; and if I ſhould give you one of mine, yet I ſhould have as many as you have in all ſtill. How many Bottles had each of them?

Anſw. THe Father had 7, and the Son had 5. ——So if

if the Father had taken one of the Sons Bottles from him, the Son would have had but 4, and the Father 8, which is double the Sons number; and if the Son had taken one from the Father, then they would have been both equal, for either of them would have had 6 Bottles.——Many other numbers may be found to do the like, which I leave for you to difcover.

PROP.

PROP. VII.

One having in the Market a Basket of Apples, another comes and asks him how many there is of them? the Owner replyes, He cannot tell; but he remembers, that when he told them into his Basket by two and two, there was one odd one at last: Also when he told them in by three & three, there was still one odd one; and also by four and four, there was still an odd one remaining; the like when he told them in by five and five, and by six and six, still one odd one remained: but when he told them in by seven and seven, then they fell even. How many Apples were there in his Basket?

Answ. HE had 721, which number being divided by

2, or 3, or 4, or 5, or 6, there will ſtill remain 1; but being divided by 7, there will remain nothing.

For 2, 3, 4, 5, 6, being multiplied continually into themſelves, will at length produce the number 720, to which add a unite, and it is 721, the number ſought. ——There are many other numbers which will afford the like, which I leave to your practice to find of your ſelf.

PROP.

PROP. VIII.

If one ſhould buy 12 loaves of bread for 12 pence, ſo that ſome of them may be two penny loaves, ſome penny loaves, ſome half-penny loaves, and ſome farthing loaves; How many of a ſort muſt he buy?

Anſw. HE muſt buy 3 two-penny loaves, 4 penny loaves, 3 half-penny loaves, and 2 farthing loaves.

For,

	d.
3 two-penny loaves are	6
4 penny loaves are	4
3 half-penny loaves are	1 $\frac{1}{2}$
2 farthing loaves are	0 $\frac{1}{2}$
12 Loaves. Pence	12

There are other numbers will do the same; which I leave to your finding out.

PROP. IX.

There is 1000 l. *to be distributed amongst* 10 *persons, namely, some Men, some Women, some Male-children, and some Female-children; with this condition, That every Man must have* 50 l. *every Woman* 70 l. *every Male-child* 130 l. *and every Female-child* 150 l. *How many must there be of each sort?*

Answ. There may be 2 Men, 3 Women, 3 Male-children, and 2 Female-children.

For

For,	l.
2 Men, at 50 *l.* apiece must have	100
3 Women at 70 *l.* must have	210
3 Male-ch. at 130 *l.* must have	390
2 Fem. ch. at 150 *l.* must have	300
10 Persons	Pounds — 1000

There are other numbers will do the like, which I leave for your practice to find out.

PROP.

PROP. X.

A Man dying, and leaving ſeven Sons, bequeaths his Eſtate in Money to be thus divided; One half to his eldeſt ſon, the half of the remainder to his ſecond ſon, the half of the remainder to his third ſon, and ſo to all the ſeven; and the remaining half to an Executor to ſee his Will performed; which remaining half was 34 l. *What was his whole Eſtate? and what every Childs part?*

Anſw. HIs whole Eſtate was 8670 *l.* And of this, the

	l.
the Executor had	34
The ſeventh Son had	68
The ſixth Son	136
The fifth	272
The fourth	544
The third	1088
The ſecond	2176
The firſt	4352
In all	8670

Concerning two Neighbours Changing of their Land.

Two Neighbours had either of them a piece of Land, the one field was four-ſquare, every ſide containing 120. perches, ſo that it was round about 480 perches. ——The other was ſquare alſo, but the ſides longer than the others field, and the ends ſhorter; for the ſides of this field were 140 perches long apiece, and the ends thereof were 100 perches apiece; ſo that this field was 480 perches about as well as the other. Now which of theſe two had the beſt bargain?

IT is wonderful to ſee how Numbers will diſcover that to be

be erronious and abſurd, which to common ſenſe and mans apprehenſion appears reaſonable; as in this bargain. ——— Firſt, for the field which is 120 perches on either ſide. ——Multiply 120 by 120, and the product is 14400; and ſo many ſquare perches doth that piece of Land contain, that is 80 acres. ———Then for the other field, —Multiply 140 (the length of one of the longer ſides of the field) by 100 perches (one of the ſhorter ſides) and the product will be 14000 perches, the content of the other field, which is leſs then the former by 400 perches, that is 2 Acres and an half; and ſo much would he have loſt that had the field of 120 perches on every ſide, though the other field were as much about.

And this error would ſtill grow greater, the narrower the ſecond field

field had been: As suppose the ends or shorter sides thereof had been but 40 perches apiece, and the longer sides 200 apiece, this field would still have been 480 perches about: but let us see how much it contains. ——Multiply 200 the longer side, by 40 the shorter side, and it will produce 8000; and so many square perches will it contain, which is but 50 Acres: So that if he had changed for this field, which is as much about as his, he would have then lost 30 Acres by the bargain.

About

About the borrowing of Corn.

A Country Farmer had in his house a vessel of Wood full of Wheat, which was 4 foot high, 4 foot broad both at top and bottom; and in all parts 4 foot, as the sides of a Die. ——One of his Neighbours desires him to lend him half his Wheat till Harvest; which he doth: ——Harvest coming, and his Neighbour is to repay; he makes a Vessel 2 foot every way, as his Neighbors was 4 foot every way, and fills him that twice, in lieu of what he borrowed. Was there gain or loss in this particular?

EXamine first what either of these Vessels will hold, and by

by that you will discover the fallacy. ——First, the vessel 4 foot high, contains 48 inches of a side; wherefore multiply 48 by 48, and the product will be 2304, which multiply again by 48, and the product will be 110592; and so many cubical or square inches of Corn did his vessel hold; the half whereof, wch is 55296 he lent his Neighbour. Now secondly, let us examine how much the second vessel will hold, it being 2 foot on every side, that is 24 inches; ——Multiply 24 by 24, the product is 576: which divide again by 24, and the product will be 13824; and so many Cubical or square inches did the lesser vessel contain; which being filled twice, it made 27648 Cubical inches of corn or wheat, which was all he paid his Neighbour in lieu of the 55296 inches which he borrowed, which is but

the just half; and so allowing 2256 cubical inches of Wheat to make a Bushel (for so many there is in a Bushel) he paid his Neighbour less by 12 bushels, and about a peck, than he borrowed of him. And this, and the reason of it is evident, as I will demonstrate to you by a familiar president. ——If you cause a Die to be made of one inch every side, and 8 other Dies to be made of half an inch every side, these 8 being laid close one to another in a square form, these 8 will be but of the same bigness with the other one Die, whose side is but an inch.

A Bargain

A Bargain between a Farmer and a Goldſmith.

A rich Farmer being in a Fair, eſpies at a Goldſmiths Shop a Neck-lace of Pearl, upon which were 72 *Pearls: the Farmer cheapning of it, the Goldſmith asked* 30 s. *a Pearl; at which rate the Neck-lace would come to* 103 l. *The Farmer looking upon it as dear, goes his way, offering nothing. Whereupon the Goldſmith calls him, and tells him, if he thought much to part with Money, he would deal with him for Corn:* ——*To which the Farmer hearkens; asks him how much Corn he would have for it at two ſhillings the Buſhel: The Goldſmith*

Goldſmith told him he would be very reaſonable, and would take for the firſt Pearle one Barly corn only, for the ſecond two corns, for the third four corns; and ſo doubling the corns till the 72 Pearls were out. To this the Farmer agrees, and immediately ſtrikes the Bargain: But ſee the event.

HE that hath any skill in Numbers, will eaſily diſcern he vanity that there is in this ind of bargaining; ſo that no nan can be bound to them: for Numbers increaſing in a Geometrical Progreſſion, do ſo prodigiouſly increaſe, that (to thoſe hat are ignorant of the reaſon) t will ſeem impoſſible they ſhould do ſo; but that it is ſo, will appear evident by this bargain, if ou enquire, Firſt, The quantiy: Secondly, The worth of ſo much

A Bargain between a Farmer and a Goldsmith.

A rich Farmer being in a Fair, espies at a Goldsmiths Shop a Neck-lace of Pearl, upon which were 72 Pearls: the Farmer cheapning of it, the Goldsmith asked 30 s. *a Pearl; at which rate the Neck-lace would come to* 103 l. *The Farmer looking upon it as dear, goes his way, offering nothing. Whereupon the Goldsmith calls him, and tells him, if he thought much to part with Money, he would deal with him for Corn:* —— *To which the Farmer hearkens; asks him how much Corn he would have for it at two shillings the Bushel: The Goldsmith*

Goldſmith told him he would be very reaſonable, and would take for the firſt Pearle one Barly corn only, for the ſecond two corns, for the third four corns; and ſo doubling the corns till the 72 Pearls were out. To this the Farmer agrees; and immediately ſtrikes the Bargain: But ſee the event.

HE that hath any skill in Numbers, will eaſily diſcern the vanity that there is in this kind of bargaining; ſo that no man can be bound to them: for Numbers increaſing in a Geometrical Progreſſion, do ſo prodigiouſly increaſe, that (to thoſe that are ignorant of the reaſon) it will ſeem impoſſible they ſhould do ſo; but that it is ſo, will appear evident by this bargain, if you enquire, Firſt, The quantity: Secondly, The worth of ſo much

much Barley in Money: and, Thirdly, the weight of it, and how it should be removed, or where stowed. Wherefore,

1. If we allow 10000 *ten thousand* corns to a Pint, (which is more then enough) then 5120000 corns will make a Quarter; but yet (for the ease of them that will make tryal) we will allow 10000000 corns to make a Quarter; by which number, if you divide the whole number of corns that the 72 Pearls would have amounted unto, being doubled, (which by cutting off the 7 last figures towards the right hand) the Quotient of that Division would be

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and so many whole Quarters of Barly would the Neck-lace have amounted unto, and some odd Bushels, which we here omit as superfluous.

2. Now

2. Now for the worth of this Barly, suppose it were sold at 15*d.* the Bushel, (which is a reasonable rate) that is 10 *s.* the Quarter: wherefore divide the foregoing number of Quarters by 2, that is, take half of it, and it will be 236118324143482 pounds sterling; which sum rendred in words, is, *Two hundred thirty six millions of millions, one hundred and eighteen thousand, three hundred twenty four millions, one hundred forty three thousand, four hundred eighty two* pounds. A vast sum of money for a Farmer. And thus, if you reckon Land for ever worth 20 years purchase, if you divide this sum of pounds by 20, the Quotient being 11805916202174, is the yearly Rent thereof: which is, *Eleven millions of millions, eight hundred and five thousand nine hundred and sixteen millions, two hundred and*

two

two thousand, one hundred seventy four pounds a year. And again, if you divide this number of pounds by 365 (the number of dayes in a year) the Quotient will be 32344975918; that is, *Thirty two thousand, three hundred forty four millions, nine hundred seventy five thousand, nine hundred and eighteen* pounds a day for ever. So great vanity may be agreed and concluded upon by people ignorant of this Science, and for want of serious premeditation. But

3. Let us consider the weight of so much Barley. If we allow 8 Bushels (or one Quarter) to weigh Two hundred weight; (but doubtless it weighs more) then the whole number of Quarters multiplied by 2, gives the weight of all the Barley to be 94447329657392 8 hund. weight. And if you divide this number by

by 20, the Quotient will be 4722366482869 6 Tuns; that is, *Forty ſeven millions of millions, two hundred twenty three thouſand ſix hundred ſixty four millions, eight hundred twenty eight thouſand, ſix hundred ninety ſix* Tuns; which will require 4722366482 8; that is, *Forty ſeven thouſand two hundred twenty three millions, ſix hundred ſixty four thouſand, eight hundred twenty eight* Ships of a thouſand Tun apiece to carry it. And to conclude, If there were *four Millions* of Nations in the World, and every one of thoſe Nations had *Ten thouſand* Sail of ſuch Ships of a *Thouſand* Tun apiece; yet all thoſe Ships would not contain it. Thus by this you may ſee, how prodigiouſly numbers do increaſe, being multiplied according to Geometrical Progreſſion.

Concerning an Agreement that a Country-Fellow made with a Farmer.

A Country-Fellow comes to a Farmer, and offers to serve him for 8 years; all which time he would require no other Wages than One grain of Corn, and one quarter of an inch of Land to sowe it in the first year; and Land enough to sowe that one Corn, and the encrease of it, for his whole 8 years: to which the Farmer assents.

THeir Bargain being thus made, let us consider what his eight years service will be worth.

worth. For the first year he hath only one quarter of an inch of Ground, and one Corn; which Corn we will suppose had in the Ear at the years end 40 Corns, (for that is few enough:) then the second year he must have 40 square quarters of inches of ground to sowe those 40 Corns in, that is, 10 square inches of Ground. And the third year, supposing those 40 Corns to produce 40 Ears, and in each Ear 40 Corns, as before, they will be in the third year increased to 1600 corns; so that he must have 1600 square quarters of inches to sowe that increase in, which is 40 square inches; and thus continuing till the 8 years be expired, the increase would be 6553600000000 corns; that is, *Six millions of millions, five hundred fifty three thousand and six hundred millions* of corns; and so

many square quarters of inches of Land must he have to sowe this increase in. Now know that 3600000000 corns, that is, *Three thousand and six hundred millions of square inches*, do make a mile, upon the superficies of plain; and that superficies of a Mile will be capable to receive 14400000000; that is, *Fourteen thousand and four hundred millions of Corns*: wherefore divide— 6553600000000 (the whole number of the Corns increase) by 14400000000, (the number of Corns that one Mile square of Land is capable to receive) and in the Quotient you shall have 455; and so many miles square of Land must there be, to contain the sowing of the increase of one Corn in 8 years, which will be about 420000; that is, *Four hundred and twenty thousand* Acres of Land; which being

rate

rated at half a Crown an Acre by the year, it will amount unto 50000; that is, *Fifty thousand* pound; which is 6250, that is, *Six thousand two hundred and fifty pound a year*: a very considerable Salary for Eight years service.

By these, and the like Contracts, we may see what absurdities are and may easily be committed, which you see the subtilty of Numbers easily discovers. I will give you by way of Discourse, some presidents concerning the increase of Creatures of several kinds, which you may make tryal of for your Recreation; As,

I.

WHat think you, if one should tell the Great *Turk* (or any other Potentate in the World, who having a great Army in the Field in continual pay) that all the Revenue appertaining to his Crown, will not for one years time maintain all the Pigs that one Sow, with all the Pigs of her race, and the increase issuing of them, shall produce in 12 years; notwithstanding he can maintain so great an Army in the field. Doubtless, he would take it unkindly: But consider; Imagine the Sow brings forth but 6 Pigs at a Litter; of which we will allow 2 to be Barrow, (and this supposition is as little

as

as may be) and then imagine that every of thoſe 4 bring as many every year, and the increaſe of them the like, during the term of 12 years ; they and their race at the end of the time will be increaſed to *Three and thirty millions* of Pigs : Now if we allow 5 ſhillings for to maintain one of theſe Pigs for a year, which is not full half a farthing a day ; yet there muſt be *Three and thirty millions* of Crowns to maintain them one year : which will make a great hole in a large Revenue.

II.

WOuld any man (that hath not skill in Numbers) imagine that 100 Sheep, and the increase thereof being preserved for the space of 16 years, should be worth above *One million, six hundred and twenty thousand pound sterling?* Yet if every Sheep do produce but one every year, at the expiration of 16 years, 100 sheep will increase unto 6553600, which is, *Six millions, five hundred fifty three thousand, six hundred* Sheep: now supposing these to be worth but 5 shillings apiece, they would at that rate amount unto 1638400; that is, *One million, six hundred thirty eight thousand four hundred pounds sterling.*

III.

III.

IN Numbers there is a ſubtile property, which ſome have above others; of which I will give you a few: As,

1. Is it not ſtrange that there is but one whole Number to be found, which being doubled, ſhall produce the ſame ſum as it would if it were multiplied in it ſelf ſquarewiſe? and that is the number 2: for 2 and 2 added together, make 4; and ſo if you multiply 2 by 2, it ſhall produce 4 alſo: and you can find no other whole number which hath the like property.

2. There is a ſecret property in the numbers 5 and 6; for if you multipſy either of theſe

numbers in themſelves, the numbers produced by thoſe multiplications, ſhall terminate or end in themſelves: as 5 multiplied by 5, produceth 25, which alſo ends in 5. Likewiſe 6 multiplied by 6, produceth 36, which terminates in 6 alſo. Alſo if any greater numbers ending in 5 or 6, be yet farther multiplied by 5 or 6, they will continually terminate or end in 5 and 6. So 325 multiplied by 5, produceth 1625; and 746 multiplied by 6, produceth 4476; the one ending in 5, the other in 6.

3. The number 9 hath a priviledge above all other numbers; for if you take any number, the nines taken in the groſs ſum all together, or in the parts ſeverally, will be ſtill the ſame; as in the number 36, it makes 4 times 9; ſo that if you take the nines out of 36, they are in number 4: and

and if you multiply 9 by 4, it will alſo produce 36; alſo if you take the nines out of 240, it is all one as if you ſhould take the ſum of the ſimple figures 2, 4, and 0; for 2 and 4 is 6: ſo if you divide 240 by 9, you ſhall find 6 remaining, which is equal to 4 and 2.

4. There is a fine harmony between theſe two numbers 220 and 284, that the aliquot-part of the one, do make up the ſum of the other; as thus, The parts of 220 are 110, 55, 44, 22, 20, 11, 10, 5, 4, 2, 1: the ſum of which aliquot-parts do make 284; and the aliquot-parts of 284, are 142, 71, 4, 2, 1; which added together make 220: and this harmony is not to be found in many other numbers.

5. But the number 6 hath an eminent Propriety, for his parts are equal to himſelf; thus his half

half which is 3, his third which is 2, and his ſixth part which is 1, being added together, do make 6; and how rare ſuch numbers are to be found, do you judge; for between One, and —— —— 1000000000000, that is, *One million of millions*, there are but Ten of ſuch Numbers to be found, and thoſe are theſe:

1	6
2	28
3	486
4	8128
5	120816
6	2096128
7	33550336
8	536854528
9	8589869056
10	137438691328

In which Numbers you may obſerve, that orderly and ſucceſſively, One ends in 6, the next in

in 8; that is, every odd number, as the first, the third, the fifth, the seventh, and the ninth, do end in 6, whose half is 3, an odd number; and the even places, as the second, fourth, sixth, eighth, and tenth numbers end in 8, the half thereof being 4, an even number. And if you proceed to find more of these Numbers, you may find the twentieth Number, that hath this quality, to be———

—1511157274515553768931328.

6. In Square and Cube Numbers there are subtile properties, as, if from an Unite you do successively add the odd numbers, all those numbers shall be square numbers; as if to 1, or Unity, you add the next odd number which is 3, the sum is 4 a square number,

number ; to which add 5, the next odd number, and the ſum is 9, a ſquare number alſo; to which add 7, the next odd number, and the ſum is 16, a ſquare number alſo ; and ſo on, as in this little Table.

For	1	&	3	is	4	Square Numbers.
	4		5		9	
	9		7		16	
	16		9		25	
	25		11		36	
	36		13		49	
	49		15		64	
	64		17		81	
	81		19		100	

So

So likewiſe, if Cubick Numbers be ſucceſſively added from Unity, theſe Numbers ſhall alſo be Square Numbers.

7. It is worth the obſerving, that no exact Square Number can end with any of theſe figures; as 2, 3, 7, or 8.

Compendious
RULES
IN
ARITHMETICK.

By which
Some ſeeming Difficulties and common Obſtacles are removed, and the performance of them rendred familiar and eaſie.

Compendium 1.

In the dividing of any great Sum, how you shall certainly know what Figure to put in your Quotient; so that you shall never take too much, nor too little, but alwayes the right; and divide your Sum by Substraction only, without Multiplication.

First, write down all the nine Digits orderly one under another,

nother, and then by the ſide of them draw a right line, and againſt the figure 1, (towards your right hand) ſet down your Diviſor, and multiply it by all the 9 Digits, ſo ſhall you ſee againſt every figure how much the Multiplication of your Diviſor by any Digit will amount unto: So that when you ſee your Remainer in your Diviſion, look in this little Table for the neareſt number leſs then your Remainer; and that figure which ſtandeth againſt that Number, you muſt alwayes put in your quotient.

Example.

Example. Suppose you were to divide any great Sum (as 98204602) by 3989, your first work is to ask, How many times 3989 (your divisor) can you have in 9820, the 4 first figures of your dividend.—— Look in this little Table for the nearest number you can to 9820, which is less, and you shall find the nearest number less, to be 7978, which number standeth against the figure 2, wherefore set 2 in your quotient, and substract 7978 out of 9820, and there will remain 1842; to which the next figure of your dividend being added, makes it 18424. Then you are to ask, how many times 3989 you can have in 18424.

	Divisor
1	3989
2	7978
3	11967
4	15956
5	19945
6	23934
7	27923
8	31912
9	35901

Look

Look in your Table for the nearest number to 18424, and you shall find the nearest less to be 15956, against which stands the figure 4; therefore place 4 in the quotient, and substract 15956 out of 18424, and there will remain 2468, which with the next figure of your Dividend 6, maketh 24686.——Then ask how often you can have 3989 in 24686; the nearest number in the Table less then this, is 23934, against which stands 6: place 6 in your quotient, and substract 23934 from 24686, and there remains 752, which with the next figure of your dividend 0, makes 7520.——Then ask how often you can have 3989 in 7520; look for the nearest number to 7520, and you shall find the nearest number less to be your divisor, 3989, standing against the figure 1; wherefore place 1 in the quotient, and

substract

ſubſtract 3989 out of 7520, and there will remain 3531, which with the next figure of your dividend 2, maketh 35312. —Then ask how many times 3989 can you have in 35312; the neareſt number in the Table leſs, is 31912, againſt which ſtands the figure 8: ſet 8 in your quotient, and ſubſtract 31912 from 35312, and there will remain 3400. —And ſo is your diviſion ended, the quotient being 24618, and $\frac{3400}{3989}$ remaining.

Ihvae

I have here inserted this Example, though not after the usual way of Division; but it may be used to any kind as well as this.

```
                        (3400 Remai.
                         3531
                         752
                        2468
                       1842
Divis. 3989 )          98204602 (24618
                        .....    Quot.
                      -----------
                       7978
                       15956
                        23934
                          3989
                          31912
                      -----------
                       98204602 Proof.
```

The making of the little Table is easie, it being made by *Addition* only, thus; Having set down your *Divisor* 3989, double it, and it

it is 7978, which ſet againſt the figure 2; then add them two numbers together, and they make 11967, which ſet againſt the figure 3; then to that number add 3989, & it makes 15956, which ſet againſt the figure 4; to this add ſtill the firſt number (your diviſor) 3989, and it will produce the Numbers as in the Table: and ſo muſt you do with any other Diviſor.

And by this means *Multiplication* and *Diviſion*, which are the two difficulteſt parts of Arithmetick, are eaſily and exactly performed by *Addition* and *Subſtraction*, without any charge to the memory.

Compendium 2.

In case a false Figure be placed in the Quotient of any Division, how to rectifie that Quotient without beginning the Work a-new.

WHen you have divided any Sum, if the Remainer at last be either greater or equal to the divisor, the quotient is false; which may be rectified without beginning the Work again, by dividing the Remainer only by the same divisor; for thereof will arise a new quotient, which added to the former quotient, the sum of them will be the true quotient.

So

So if 7290 be divided by 27, the numbers being placed according to the usual way of Division.

Because 27 can be had in 72 but twice, set 2 in the quotient, saying 2 times 27 is 54, from 72, and there remains 18, which write over 72, cancelling your other figures: then say, How many times 27 in 189? say 7; but if you should mistake, and write 5 in the Quotient, and say 5 times 27 is 135, out of 189, there remains 54, which write down as before, and remove the Divisor, & say, How many times 27 in 540? the answer is 20, but must never be above 9: say therefore 9 times 27 is 243, out of 540, and the remainer is 297, which being the last remain, (and greater than

```
   2
  59
 1847
7290(259
 2777
  22
```

the Divisor) shewes the Work to be false, and the Quotient 359 to be too little.

Wherefore, divide the last remainer 297 by 27, and the quotient will be 11, and nothing remaining; wherefore, if you add this quotient 11, to the other quotient 259, the sum of them, 270, will be the true quotient of 7290 divided by 27.

Compen-

Compendium 3.

How to abbreviate your Work in Multiplication and Division, when your Multiplyer or Divisor consist of a Unite with 1, 2, 3, or more Cyphers.

1. THus, if 365 were to be Multiplied by 10, add one Cypher thereunto, making it 3650, and it is done: if it were to be multiplied by 100, add 2 cyphers to it; if by 1000, add 3 cyphers to it, and your work is ended.

2. In Division likewise, if 763258 were to be divided by 10, cut off the last figure towards the right hand, and the rest of the figures is the quotient; so the quotient of 763258 divided by 10, is (76325 $\frac{8}{10}$: if by 100, it

is $(7632\frac{58}{100}$: if by 1000, it is $(763\frac{258}{1000}$, &c.

3. Alſo if the Multiplier conſiſt of one or more Cyphers in the laſt place, you may omit the multiplying of them, and ſet them down at laſt; as if it were required to multiply 3257 by 2600:

	Place the numbers
3257	as you ſee here done:
2600	then multiply 3257
———	by 26, the product
19542	will be 84682; to
6514	which if you add two
———	cyphers for the two
8468200	cyphers in the Multi-
	plier, then it will be

8468200, which is the true product.

4. Alſo if Cyphers be in the middle of the Multiplier among other figures, you may abbreviate your Work, by removing your next figure a place farther where any cypher comes.

As

As if 682357 were to be multiplied by 30204: Place the figures as is here done;

682357
30204
2729428
1364714
2047071
20609910828

Then Multiply 682357 by 4, it produceth 2729428; then (because a cypher is next) skip one place, and multiply it by 2, it produceth 1364714, setting your 4 two places from your right hand towards the left: then for the next place, being a cypher, do the like, setting your multiplication by 3, namely 2047071, two places yet forwarder towards the left hand; then add these

three lines together, in the ſame order they now ſtand, and they make 20609910828, which is the true product of that multiplication.

Compendium 4.

How you may moſt compendiouſly and ſpeedily multiply by any of the nine Digits, without charging of the Memory.

I. *To Multiply any Number by* 2.

EIther double it, or ſet it down twice, and add the two ſums together; but it is beſt done by doubling it in your mind.

So if you were to multiply 73684 by 2; it being ſet down once, begin at the right hand, and ſay, 4 and 4 is 8, ſet down 8; then 8 and 8 is 16, ſet down 6 and

and carry 1; then ſay 6 and 6 is 12, and 1 carried is 13, ſet down 3 and carry 1; then ſay 3 and 3 is 6, and 1 is 7, ſet down 7. Laſtly, 7 and 7 is 14, which being the laſt figure, ſet 14 down, and your Multiplication is ended, and will ſtand thus:

147368.

II. *To Multiply any Number by 3.*

To the Number given, add the double thereof, the ſum of them ſhall be the product.

So if you were to multiply 73684 by 3, firſt double it, or multiply it by 2, as before, and it maketh 147368, to which if you add the Given Number 73684, the ſum of them will be 221052, which is equal to the product, as by the Work appears.

73684 Number given.
147368 its double.

221052 Multiplied by 3.

III. *To Multiply any Number by 4.*

Double the Duplication thereof, and your Work is ended.

So if you were to Multiply 73684 by 4, the Duplication thereof was 147368, which being doubled in your mind, or otherwise ſet down, giveth —— 294736, which is the product of 73684 multiplied by 4, as here appeareth;

73684 Number given.
147368 its Duplication.

294736 Multiplied by 4.

IV. *To*

IV. *To Multiply any Number by* 5.

To the Number given add a Cypher, or in your mind conceive one to be added: the half of that number is the product thereof multiplied by 5.

So if you were to Multiply 73684 by 5, ſet, or conceive a cypher after the 4, then it is 736840; then beginning at the left hand, ſay, The half of 7 is 3, and 1 remaining: ſet down 3, and in your mind carry 1 to 3, making it 13: Then ſay, The half of 13 is 6, and 1 remaining; ſet down 6 and carry 1; then the half of 16 is 8, ſet down 8; then the half of 4 is 2, ſet down 2: laſtly, the half of 0 is 0, ſet down 0, and your Work is ended; the product 4 being 368420, as by the work appears.

(cypher added.
736840 the number given, with a
368420 its Multiplication by 5.

V. *To Multiply any Number by 6.*

To the Number given add a cypher; then take the half of that number, and to it add the number given, the sum of them shall be the product of the given number multiplied by 6.

So if you were to Multiply 73684 by 6, add a cypher thereto, and it is 736840, the half whereof is 368920, to which if you add 73684 (the number given) the sum of them will be 442104, which is the product of 73684, being multiplied by 6. As here appeareth. (cyph. added.
736840 the Number given, with a
368420 the half thereof.
73684

442104 the product mult. by 6.

VI. *To*

VI. *To Multiply any Number by 7.*

To the Number given add a cypher, & take the half thereof; add this half to the double of the number given, the sum thereof shall be the product of the given number multiplied by 7.

So if you were to Multiply 73684 by 7, add a cypher thereto, and it is 736840; the half of this number is 368420, which being added to 147368, the double of the given number, the sum will be 515788, which is the product of the given number 73684, being multiplied by 7: As here appeareth.

147368 the double of the given (number.
368420 half the given number, a (cypher added.
———
515788 the product being multi- (plied by 7.

VII. T

VII. *To multiply any Number by* 8.

Double the Number given, and ſubſtract that doubled number from the given number, a cypher being added thereto.

So if you were to Multiply 73684 by 8, the double of the given number is 147368; this being ſubſtracted from 736540, (which is the given number with a cypher added) the remainer will be 589472, which is the product of the given number 73684, being multiplied by 8; as here appears.

736840	number given, with a cypher added.
147368	double of the giv. numb.
589472	product multiplied by 8.

VIII. *To*

VIII. *To multiply any Number by 9.*

Add a Cypher to the given Number, and from that number substract the given number, the remainer shall be the product.

So if you were to Multiply 73684 by 9, add a cypher to it, and it will be 736840; from which if you substract 73684 your given number, the remainer will be 663156; which is the product of the given number Multiplied by 9: As here appeareth.

736840 given numb. with a cyph.
 73684 the given number substr.

663156 Product multiplied by 9.

Com-

Compendium 5.

How readily to know how many Pounds are contained in any number of Shillings, without writing of them down, or troubling the Memory.

COnceive the last figure of the Number given to be taken away, or cut off with a dash of the Pen; then the half of the other part of the Number are Pounds; and if 1 remain, that 1 is 10 *s.* and the figure cut off (or supposed to be cut off) are shillings also.

Example.

In 642‖7 *Shillings, how many Pounds?*

Suppose the 7 to be cut off; then the half of 6 is 3, set down 3; the half of 4 is 2, set down 2;

the

the half of 2 is 1, ſet down 1: ſo is there in 6427 ſhillings, 321 *l.* 7 *s.*

642||7 Shillings.
Pounds 321-7 Shillings.

In 579||8 *Shillings, how many Pounds?*

Suppoſe the 8 to be cut off, then ſay, The half of 5 is 2, and 1 remaining, ſet down 2 and carry 1; then ſay, the half of 17 is 8, and 1 remaining, ſet down 8 and carry 1; then ſay, the half of 19 is 9, and 1 remaining, ſet down 9, which being your laſt figure, the 1 remaining is 10 *s.* which you muſt add to the 8 that was cut off, and it makes 18 *s.* So that in 5798 ſhillings there are 289 *l.*—18 *s.* As here appeareth.

xx (1 *s.*
579|| 8 Shillings.
289 Pounds —18 *s.*

If

If you would turn Pounds at one work into Pence, then Multiply the Pounds by 140,and the product is Pence.

So 235 *l.* being multiplied by 240, produceth 56300 pence.

On the contrary, to bring Pence into Pounds at one work, divide the Pence by 240, and the quotient will be Pounds.

So 56300 Pence being divided by 240, produceth in the quotient 235 *l.*

Compen-

Compendium 6.

When any Question is propounded in the Rule of Three, *where Halves, Quarters, or three Quarters of Weight or Measure are in the Question, or where Nine-pences, Six-pences, or Three-pences are ingredients, how you shall resolve such Questions without the help of Fractions, or reducing of your Money, Weight, Measure, to their least Denomination.*

YOu must here ſuppoſe your Money, Weight, or Meaſure, the Integer to be divided into 100 parts; which being preſuppoſed, the 25 is a Quarter, 50 is Half, and 75 is three Quarters of any Money, Weight, or Meaſure.

This

This presupposed, we will proceed to *Example* 1.

If 3 yards of any thing cost 1 s. 3 d. *what will* 85 *yards cost ?*

3———11.25———85

85

5625

9000

956.25

l. s. d.

15—18—9

~~221~~

~~95625~~ (31||8.75

~~33333~~

Here inftead of 11 *s.*—3 *d.* I fet
down 11.25, the 11 fignifying
11 *s.* and the 25 3 *d.* which is the
quarter of a fhilling; and then
I multiply and divide, as if it
vere all whole numbers. For
nultiplying 11.25 by 85, the
product is 956.25; the 25 at the
nd feparated by a prick, is the
raction of a quarter. This num-
er divided by 3, the quotient is
18.75, that is, 318 *s.* and 75,
hat is three quarters of a fhil-
ing, or 9 *d.* So that if 3 yards
oft 11 *s.*—3 *d.* 85 yards will coft
18 *s.* and 9 *d.* which is 15 *l.*—18 *s.*
d.

Example

Example 2.

If $6\frac{1}{2}$ *Ells of any Commodity cost* 12 l. –15 s. *what shall* $37\frac{1}{4}$ *Ells cost?*

Set your numbers thus:

Ells.		l.		Ells.
If 6.50	*cost*	12.75	*what*	37.25

```
                                37.25
                                12.75
                               ------
                                18625
                               26075
                               7450
  ~~11~~ 4                     3725
  ~~5047~~                    --------
  ~~47403~~75 (73.06           4749375
  ~~6555~~50
  ~~666~~
```

Here instead of 6 Ells and $\frac{1}{2}$, I set down 6.50, 50 being the half of 100. Again, for 12 *l.* –15 *s.* I set down 12.75, 75 being three quarters of 100, as 15 *s.* is $\frac{3}{4}$ of a Pound. And lastly, for 37 Ells and

and a quarter, I set down 37.25, 25 being one quarter of 100.

And then multiplying and dividing of these as whole Numbers, according to the nature of working the *Rule of Three*, I find my quotient to come out 73.06, that is, 73 *l.* $\frac{06}{100}$ parts of a pound, or 20 *s.* which reduced, is 1 *s.* 2 *d.* 1 *q.* $\frac{6}{10}$ of a farthing. So that if 6 $\frac{1}{2}$ Ells cost 12 *l.* 15 *s*, 37 $\frac{1}{4}$ Ells will cost 73 *l.* 1 *s.* 2 *d.* 1 *q.* $\frac{6}{10}$.

FINIS.

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